

REMARKS

Status of Application

Claims 1-9 and 11 are pending in the present application. No new matter has been added.

Objections to the Specification

The specification is objected to for incorporating by reference what the Examiner considers to be "essential material." While Applicant respectfully disagrees with the objection, solely for purposes of advancing prosecution Applicant has amended the specification to include relevant portions of the material that was incorporated by reference in the as-filed application at p. 11, in connection with steps e and f. A few small changes have been made to the material, such as the renumbering of equations for consistency with the preexisting specification, grammatical changes and corrections, *etc.*, but no new matter has been added. Accordingly, Applicant respectfully requests withdrawal of the objection to the specification.

Claim Rejection – 35 U.S.C. §112, First Paragraph

Applicant respectfully submits that the amendments to the specification discussed above also overcome the Examiner's rejection of claims 1-9 and 11 under 35 U.S.C. §112, first paragraph. Accordingly, Applicant respectfully requests that the rejection of these claims be withdrawn.

Double Patenting Rejection

Claim 1 stands rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claim 2 of U.S. Pat. No. 6,527,695 B1 ("Davey 1"), in view of Ruohonen, "Transcranial Magnetic Stimulation: Modeling and New Techniques," Doctoral Thesis, Department of Engineering Physics and Mathematics, Helsinki University of Technology, 1998, pp. 1-50 ("Ruohonen").

Applicant respectfully submits that Ruohonen fails to cure the deficiencies of Davey 1 and, as a result, Claim 1 is not obvious in view of Davey 1 and/or Ruohonen, either taken alone or in combination.

For example, claim 1 recites:

1. A computerized method of optimizing properties of a magnetic core, the core having inner and outer radii and windings, the computerized method having computer-executable instructions for performing the following:

a) *allowing the inner and outer core radii to change parametrically in a nested loop;*

b) computing core reluctance, number of turns, and winding resistance for each position, wherein the core reluctance is computed using a boundary element analysis for the core, wherein the core is assumed to have a one-turn inductance;

c) computing a maximum induced membrane voltage based on the following equation:

$$V_m(t) = f \sqrt{\frac{2W}{\Re}} \omega \tau_L (4\omega^2 \tau_L^2 - 1) \cdot \frac{\left(e^{\frac{t}{2\tau_L}} \cos(\beta) + \frac{e^{-\frac{t}{2\tau_L}} (2\tau_L \tau_m \omega^2 - 1) \sin(\beta)}{\sqrt{4\omega^2 \tau_L^2 - 1}} - e^{-\frac{t}{\tau_m}} \right)}{4\omega^4 \tau_m^2 \tau_L^3 + \omega^2 (4\tau_L^3 - \tau_m^2 \tau_L) + (\tau_m - \tau_L)};$$

$$\text{where } \beta \equiv \frac{1}{2} \sqrt{\frac{4\omega^2 \tau_L^2 - 1}{\tau_L^2}} t.$$

d) fitting the maximum induced membrane voltage to the inner and outer core radii using a multi-variable spline analysis; and

e) using a variable metric sequential quadratic program algorithm to compute a value for the inner and outer core radii that maximizes the maximum induced membrane voltage.

(Emphasis added).

Applicant first notes that the Office Action acknowledges that Davey 1 does not teach “allowing the inner and outer core radii to change parametrically in a nested loop” as claimed. Office Action, p. 6. The Office Action points to col. 7, ll. 41-45 of Davey 1 as stating: “[t]he choice of the inner radius depends on an optimized balance between decreasing the reluctance and decreasing the resistance,” but this statement does not indicate a mechanism by which the “optimized balance” may be achieved. Thus, because Davey 1 does not teach or suggest “allowing the inner and outer core radii to change parametrically in a nested loop,”

the Office Action combines Ruohonen with Davey 1. However, Ruohonen contains nothing more than the following self-evident statements: “[c]oil design must always be taken into account when constructing TMS equipment,” “[i]n one study, a mathematical method was used to maximize the focality by changing the coil shape,” and “[p]roblems with power consumption and coil heating can be alleviated by reducing the coil’s resistance, determined by the wire gauge and coil geometry.” Ruohonen, p. 23; Office Action, p. 6.

The Office Action states that the claimed “allowing the inner and outer core radii to change parametrically in a nested loop” would therefore be obvious in view of Ruohonen’s general statements regarding coil geometry. Therefore, followed to its logical conclusion, the rationale of the Office Action would use the combination of Davey 1 and Ruohonen to obviate *any method* for optimizing properties of a magnetic core, *regardless of the manner in which the optimization is carried out*, simply because Ruohonen made a statement regarding the desirability of accounting for core design. This simply is not permissible, unless either reference offers some teaching of the claimed core radii change, or even a hint of a combination that would produce this claimed feature. That hint is not provided by either Davey 1 or Ruohonen.

Instead, both Davey 1 and Ruohonen fail to teach or suggest the claimed “allowing the inner and outer core radii to change parametrically in a nested loop.” Thus, even if the teachings of Davey 1 and Ruohonen were combined, they would not teach or suggest the claimed invention to a skilled artisan. Accordingly, Applicant respectfully requests that the rejection of claim 1 under the judicially created doctrine of obviousness-type double patenting be withdrawn.

Claim Rejection – 35 U.S.C. §103(a)

Claims 1-9 and 11 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Davey 1 in view of Ruohonen, “Transcranial Magnetic Stimulation: Modeling and New Techniques,” Doctoral Thesis, Department of Engineering Physics and Mathematics, Helsinki University of Technology, 1998, pp. 1-50 (“Ruohonen”). Applicant respectfully submits that claim 1 is allowable for the reasons set forth above. Applicant respectfully submits that Davey 1 and/or Ruohonen, either taken alone or in combination, fail to teach or suggest the subject matter of claims 1-9 and 11 for the reasons discussed above in

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connection with the present Reply's discussion of the obviousness-type double patenting rejection. Accordingly, Applicant respectfully requests that the rejection of claims 1-9 and 11 under 35 U.S.C. §103(a) be withdrawn.

CONCLUSION

In view of the foregoing, applicants respectfully submit that the claims are allowable and that the present application is in condition for allowance. Reconsideration of the application and an early Notice of Allowance are respectfully requested. In the event that the Examiner cannot allow the present application for any reason, the Examiner is encouraged to contact the undersigned attorney, Christos A. Ioannidi at (215) 564-8994, to discuss resolution of any remaining issues.

Respectfully submitted,

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